Market Integration and Convergence in Consumption Patterns*

Eve Colson-Sihra† José De Sousa‡ Thierry Mayer§

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Preliminary version

Abstract

This paper explores the evolution of taste distances across French departements in a context of deep market integration. Using household survey data on food consumption in France from 1974 to 2005, we find that (1) France is characterized by strong localized tastes in food consumption, which (2) converge over time, and (3) not only due to changes in price and income. In short, France becomes "flatter", culturally more homogenized.

Keywords: Convergence, Culture, Market Integration

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†Hebrew University. eve.sihra@mail.huji.ac.il

‡U. Paris-Sud, RITM and CREST. jose.de-sousa@u-psud.fr

§Sciences-Po, Banque de France, CEPII and CEPR. thierry.mayer@sciencespo.fr

1 Introduction

At the beginning of the eighties, Levitt (1983) claimed that "the world's needs and desires have become irrevocably homogenized." He pointed to the ascendancy of the "global corporation" that "sells the same things in the same way everywhere." There is however surprisingly little empirical evidence of a homogenization in needs and desires despite a more globalized world. We aim to fill this gap by estimating the degree of homogenization of consumption patterns in a context of deep market integration.

The consequences of homogenizing consumption, and culture in general, are being hotly debated. The opposition to globalization is now prevalent in political discourses of various countries, with specific protests on its impact on homogenizing consumption behaviors.[1] Beyond concerns,[2] reducing cultural differences across and within countries could bring important benefits.[3]

In this paper, we explore the evolution of taste differences across French departements. Market integration in France has dramatically increased since the 1970s, following the development of high speed trains and highways that changed the ability to move people, ideas, goods, and services (see section 2.2 for some examples). Our results indicate that France is characterized by strong localized tastes in food consumption, which converge over time. This convergence appears not to be fully explained by changes in the economic environment (i.e. by convergence in prices and income). In short, we find that France

[1] Protests range from the "McDonaldization" (Ritzer, 1983) or "coca-colonization" of the society to the influence of GAFA, an acronym for Google, Apple, Facebook, and Amazon.

[2] Concerns are related to perceived threats to culture and values. For instance, 69% of US citizens think their way of life must be protected against foreign influence (Pew, 2009). A recent survey by *The Economist* (November 18, 2016) reveals that, on average, more than 62% of respondents in 19 developed and emerging countries agree that a country is stronger when its people have a shared and common culture, that can be threatened by globalization. See also Mayda and Rodrik (2005).

[3] Among the benefits, we may emphasize the gains from trade (Janeba, 2007; Atkin, 2013; Bisin and Verdier, 2014), the ease of public good provision (Alesina et al., 1999), the increase in social capital (Alesina and La Ferrara, 2000), and the decreasing probability of conflict (Montalvo and Reynal-Querol, 2005).

becomes culturally more homogenized.

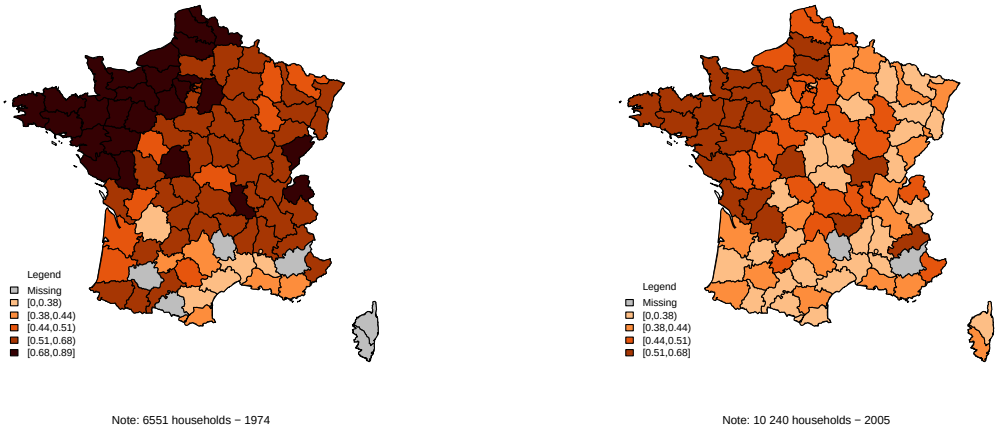
We use household surveys on food consumption in France for two years far apart in time, 1974 and 2005, to explore how consumption patterns evolved over a 30-year period of deep market integration. Food consumption offers several advantages to tackle a major challenge in estimating convergence in a context of deep integration: How to separately identify changes in taste from changes in price and income? A first advantage is the consistent availability of food items in consumer spending surveys, which provide detailed information on food expenditures and quantities, as well as household and individual characteristics. Second, food attributes are more stable than other products: they evolve slowly, allowing to track changes in consumer behavior across time and space—contrary to durable goods like cars or household appliances for instance, which experienced more drastic changes in composition and characteristics. Third, food is strongly associated with group identity and membership, a fact reported by anthropologists and sociologists alike (Barthes, 1961; Mintz and Du Bois, 2002). Food is considered a fast-moving component of culture, which could rapidly change with market integration.

France is characterized by a high heterogeneity in food consumption patterns and local cultures. The allocation of expenditure on fats and oils is a well-known example of spatial divide in consumption habits: the North-West of France uses butter as a cooking fat, while the South-East uses olive oil.[4] The left panel of Figure 1 shows that in 1974 the share of butter in expenditures on fats and oils appears indeed to be spatially concentrated in North-West regions such as Normandy or Brittany. The right panel, in 2005, shows that the entire territory is converging to a diet with less butter. The highest share of consumption (over 68 percent) disappeared, although the geographical divide in consumption remains visible. The example of cooking fats generalizes to other food cat-

[4]This divide is historical, as shown by the map of fat consumption in rural France in 1952 (see Appendix Figure A.1).

egories: We observe a significant raw convergence in overall food consumption despite local heterogeneity.

Figure 1: Share of Butter in Fat Expenditures, 1974 vs 2005



Notes: The graphics represent the share of butter in household expenditures on fats and oils in 1974 (left panel) and 2005 (right panel).

To tease out changes in culture from changes in the economic environment, we first estimate a structural demand system on food products using two rounds of the French consumer survey (1974 and 2005). Our taste measure is estimated at the *départements* (hereafter departements) level, which is a geographical division of France into around 100 administrative units. The taste is the departement component of food budget shares that cannot be explained by the vector of prices, total food expenditure and household controls. In a second step, with taste estimates in hand, we construct a bilateral taste difference across pairs of French departements for each year and product. We regress these bilateral taste differences on bilateral geographical distance and contiguity, conditioning on departement-by-year-by-product fixed effects to control for any systematic differences across departements, year and products (availability, access to ports, fraction of migrants, etc.). We find that bilateral taste difference increases with geographical distance. More interestingly, the variance of the bilateral taste differences sharply decreases from one pe-

riod to the other, as well as the geographical distance elasticity. The reduction in taste distance is fairly robust. **It is true across all products and categories, even those products for which local cultures are particularly persistent, such as the use of fat.** These results provide evidence towards a reduction in food taste differences between French departements from one generation (the 70s) to another (the 2000s).

Various confounding factors should be controlled for to ensure that convergence in taste is not spurious. First, we account for supply changes, such as changes in availability of varieties, quality effects and price endogeneity. Second, we control for potential composition effects arising from migration, and media exposure, notably to common news and advertisement. We document evidence that none of these factors appears to explain the observed convergence in taste.

There is little empirical evidence on the prediction of Levitt (1983) regarding the convergence in "needs and desires" despite a more globalized and integrated world. On the contrary, a wide body of literature points to persistent, spatially correlated, heterogeneity of consumption patterns within and between countries (Atkin, 2013, 2016; Bronnenberg et al., 2012; Dubois et al., 2014). Empirical evidence of persistent differences extends to other cultural choices, such as values, baby's name or music consumption (Head and Mayer, 2008; Disdier et al., 2010; Ferreira and Waldfogel, 2013; Bertrand and Kamenica, 2018; Desmet and Wacziarg, 2018). A few studies provide evidence of a convergence in food consumption patterns (Gracia and Albisu, 2001; Kónya and Ohashi, 2007; Aizenman and Brooks, 2008). They do not control, however, for the change in the economic environment occurring from integration. We estimate a structural demand system to account for changes in the economic environment, and find a convergence in tastes over time.

Our study is also related to the literature on the effects of integration on cultural diversity.[5] Theoretical predictions are ambiguous. Depending on the assumptions on the

[5]Our work also connects with research in trade aimed at measuring the impact of integra-

type of trade and social interactions, models may predict that trade integration reinforces cultural diversity (Olivier et al., 2008; Belloc and Bowles, 2013), or leads to cultural convergence (Bisin and Verdier, 2014; Maystre et al., 2014). Our paper points towards a faster cultural convergence than what would be predicted by price and income changes. This is consistent with social interactions across locations, or a cultural externality sufficiently large so as to tilt the cultural advantage in favor of a global cultural trait.

The article is organized as follows. Section 2 presents the data and the French context. Section 3 provides stylized facts on consumption patterns, prices and income convergence in France between 1974 and 2005. Section 4 uses the structural demand system to estimate the departement taste parameters and check their convergence. Section 5 discusses supply-driven convergence and performs several robustness checks. Section 6 introduces other potential mechanisms for convergence aside from supply side. Section 7 concludes.

2 Data and French Context

2.1 The Family Budget Survey

The Family Budget Survey or *Budget des Familles* (hereafter BDF) is conducted by the Institut National de la Statistique et des Etudes Economiques (INSEE) whose main goal is to evaluate living standards. Each survey, performed every five years, records household expenditure for food and non-food items following the National Accounts classification. It also provides detailed data on demographic, economic, social and spatial characteristics of the household and of each of the members such as age, sex, name, number of children, income, education, living conditions, and socio-professional category.

tion/globalization on welfare and the cost of living (Feenstra, 1994; Broda and Weinstein, 2006; Atkin et al., 2018; Redding and Weinstein, 2018; Hummels and Lee, 2018).

Each survey represents a random uniform sample of about 10,000 to 15,000 dwellings, and covers all metropolitan France. The detailed expenditures of each household are recorded during a fifteen days survey in a notebook. In order to take into account seasonal effects, each survey is conducted in eight waves (one eighth of the sample each), of six weeks each, over an entire year.

Expenditures are recorded in each survey but quantities only in two rounds: BDF 1973-74 and BDF 2005-06. We use these two rounds in order to compute unit values for each good consumed. The 1973-74 round comprises 14,082 households and the 2005-06 contains 10,240 households.

2.2 Economic Integration in France

During the thirty-year period, from 1973-74 to 2005-06, France underwent a significant economic integration (Combes and Lafourcade, 2005), following the development of high speed trains and highways that changed the ability to move people, ideas, goods, and services across French departements. The project to build a French intercity high-speed rail service was launched in the 1970s. Following the inaugural service between Paris and Lyon in 1981, the network, centered on Paris, has expanded to connect main cities across France (Marseille, Lille, Bordeaux, Strasbourg, Rennes). The time taken by train to travel from Paris to Marseille, via Lyon, decreased from 6 hours and 34 minutes in 1974 to 3 hours in 2005.[6] The French highway network also developed dramatically. At the beginning of the 1970s, only 1,125 km of intercity highways were in service. Thirty years later, at the beginning of the 2000s, the highway network was over 10,000 km long (Fayard et al., 2005). The average driving time needed to reach the nearest motorway

[6] See SNCF Open Data.

junction from each city was approximately halved over this period.[7]

2.3 Household Location

Both rounds of the survey contain city and departement identifiers. Departements are defined according to the administrative division of metropolitan France into 96 units called "départements". We consider the departement to be the appropriate unit of analysis for a number of reasons. Its creation dates back from the first French constitution, voted in 1790, with a clear economic motivation. The size of each departement was such that it would be possible from any point inside the departement to reach its centrally located capital city and come back within 48 hours by horse.[8] Even today, departements represent meaningful lines of demarcation inside France (see Combes et al., 2005). They have been given an important number of social and welfare allowances, with corresponding budgetary transfers. In particular, the departement is in charge of social actions, education, transport infrastructures, and the cultural heritage management. Interestingly, if the number of households surveyed in 1974 is larger than in 2005 (see above), a lower number of cities and departements have been covered in 1974. Our sample contains 1031 cities in 89 departements in 1974 and 2380 cities in 94 departements in 2005.[9]

2.4 Food Expenditure

The main issue in following consumption trends over time is the entry or exit of products. To keep track of similar items over time, we focus on food expenditures which are

[7] Using data from INSEE, we computed that the average driving time needed to reach the nearest motorway junction from each city was 59 minutes (s.d.=38) in 1969 versus 26 minutes (s.d.=32) in 2008.

[8] Accordingly, French departements are much smaller and more regular in size than US states or Canadian provinces.

[9] French communes, called cities for simplicity, are analogous to civil townships and incorporated municipalities in the United States. As of January 2015, there were 36,681 cities in France.

relatively more stable than other products. They evolve more slowly, allowing to track changes in consumer behavior across time and space – on the contrary to, say, durable goods which overcame a drastic change in composition and characteristics. Moreover, food is strongly marked by group identity and membership, a fact reported in the anthropological and sociological literature (Barthes, 1961; Mintz and Du Bois, 2002). As a cultural product, food can be viewed as a fast-moving component of culture, which may vary with market integration. Food therefore is a promising starting point in the analysis of the evolution of consumption patterns.

In our empirical analysis, we consider a two-level demand system with nine broad categories of food at the higher level and various goods within each broad category at the lower level. For example, we consider a lower level demand of butter and olive oil within the fat category. Table 1 shows the nine broad categories and the corresponding goods. This categorization is inspired from Dubois et al. (2014) (see their Table A1). The only two differences compared to Dubois et al. (2014) is that (1) we add the sweeteners, which represent a tiny share of household expenditures, to the Prepared category and (2) we create an Alcohol category by keeping the alcohol consumption in our analysis.

Table 1: Food Categories and Corresponding Goods in BDF Surveys

Broad Categories	Main Good Items
Alcohol	Spirits, beer, champagne, cider, wine.
Dairy	Milk, cream, cheese, and yogurt.
Drinks	Sodas, water, coffee, tea and beverages other than alcohol.
Fats	Oils, butter, margarine, and lards.
Fruits	Fresh, canned or frozen fruit as well as fruit juices.
Grains	Flour, cereals, dry and fresh pasta, rice, couscous, breakfast cereals, and breads.
Meats	Beef, pork, lamb, veal, poultry, as well as bacon, ham, sausages, eggs. and all fish and seafood, whether fresh, smoked, frozen or canned; nuts.
Prepared	All commercially prepared items (whether sweet savory, frozen, canned or deli) and sweeteners (Sugar, syrup, honey, and artificial sweeteners).
Vegetables	Fresh, canned or frozen vegetables and starchy food.

Compared to household expenditure surveys, barcode data would provide more detailed food-purchase information, but would only be available for the last decade. We can

however check if food expenditures in the BDF surveys give similar aggregate measures than the detailed barcode data used in Dubois et al. (2014) for the year 2005. We perform this sanity check by constructing the same categories than in Dubois et al. (2014) and the same aggregates by category: expenditure levels and shares (see their Table 3) and price means (see their Table 5).

Table 2 compares expenditure levels and shares in BDF and barcode data in 2005 by using Dubois et al. (2014)'s food categories. If expenditures in U.S. dollars per quarter are different across the two datasets, the expenditures in shares are remarkably similar.

Table 2: Expenditure by Broad Food Category in 2005

	Expenditure ($ per quarter)		Expenditure shares (%)	
	(1)	(2)	(3)	(4)
Category	BDF	DGN	BDF	DGN
Dairy	82.75	74.90	14.4	16.7
Drinks	33.91	26.81	5.9	5.9
Fats	12.40	15.14	2.2	3.3
Fruits	40.65	29.65	7.1	6.6
Grains	44.90	25.33	7.8	6.0
Meats	180.22	147.53	31.5	31.0
Prepared	122.50	96.35	21.4	21.2
Sweeteners	1.51	5.85	0.3	1.4
Vegetables	54.17	44.22	9.5	9.7

Notes: we make our dataset comparable with Dubois et al. (2014) by adjusting our food categories (see Table 1). We create the Sweeteners category by separating sweeteners from Prepared and we drop the Alcohol category. Col. (1) and (3) report statistics from the "Budget des Familles" [BDF]. Col. (2) and (4): statistics from barcode data, reported in Dubois et al. (2014), Table 3. Figures are the mean of the distribution across households and quarters and are per person per quarter using an adult equivalent caloric needs scale, conditional on strictly positive expenditure in that category in that quarter. Expenditure is in US$ using the same exchange rate of €1 = $1.25.

Table 3 reports the median and mean unit values in BDF surveys in 2005 (columns 1 and 2), and the mean barcode prices (column 3) reported by Dubois et al. (2014) for the same year. Despite using unit values, computed as expenditures over quantities, in BDF instead of observed prices in barcode, the numbers are very comparable, and the price hierarchy is almost preserved between the two datasets. To sum up, although the barcode data offers relatively more detailed information on food consumption than the household

surveys, it is reassuring that we get comparable estimates of average unit values/prices and expenditures in 2005.

Table 3: Mean and Median Prices by Broad Category in 2005

	BDF		DGN
	(1)	(2)	(3)
Category	Median	Mean	Mean
Fruits	2.23	2.83	2.09
Grains	3.50	3.63	3.89
Dairy	4.65	6.12	3.26
Meats	11.10	12.21	10.33
Oils	5.40	5.49	5.19
Sweeteners	2.43	2.73	2.79
Drinks	1.12	4.87	0.89
Prepared	6.36	7.94	6.04
Vegetables	2.95	4.57	2.53

Notes: we make our dataset comparable with Dubois et al. (2014) by adjusting our food categories (see Table 1). We create the Sweeteners category by separating sweeteners from Prepared and we drop the Alcohol category (not included in Dubois et al., 2014). Col. (1) and (2) report statistics from the "Budget des Familles" [BDF]. Col. (3) depicts statistics from barcode data, reported in Dubois et al. (2014), Table 5. Units are US$ per 1 kilogram using the same exchange rate of €1 = $1.25.

3 Unconditional Convergence of Food Consumption

3.1 Unconditional Convergence in Budget Shares

We first check for converging pattern in the raw consumption data. To do so, we explore the correlation between the growth in average budget share of each of the nine food categories from 1974 to 2005 and the initial 1974 share for each French departement.

We find that the gap in average consumption shares between the French departements is closing over time. Appendix Figure C.1.1 illustrates the unconditional convergence of budget shares for each broad category. They highlight two other interesting patterns:

first, the initial shares (1974) widely differ across French departements, consistent with localized tastes. Second, the budget shares do not converge in a single direction. For most of our nine categories, we observe both positive and negative growth rates. Departements having a relatively lower initial budget share experience a higher growth rate, while those having a relatively higher initial budget share tend to decrease their consumption.

Two issues threaten the raw consumption convergence observed in the data to be a mere spurious correlation. The first issue, measurement error, is known to be a potential cause of spurious convergence in the growth literature (see Acemoglu, 2008). If the initial budget share s_{1974} is imprecisely measured, then the measurement error is also found in the growth rate $g = \frac{s_{2005}}{s_{1974}} - 1$. A spurious convergence would be observed in the case of a non-random measurement error following a very specific pattern: if the observed higher initial shares are due to a larger positive measurement error. As the initial share is at the denominator of the growth rate, a larger measurement error on the high shares also implies a lower growth rate. We could therefore observe a spurious convergence driven by this specific pattern of measurement error.

We perform a counterfactual analysis to address this issue. The question we ask is: if there is no convergence and no error at $t + 1 = 2005$, what is the minimum error needed at $t = 1974$ to obtain the convergence pattern of our data (see Appendix Figure C.1.1)? We consider a constant growth rate across French departements in budget shares (i.e. no convergence),[10] and only assume measurement error on the initial share s_{1974}.[11] Appendix Table C.2.1 shows the results of the counterfactual analysis. We observe that in order to reproduce our convergence patterns, this type of measurement error needs to bias the initial budget shares by 30% on average (50% to 90% for the highest share). This measure-

[10] We consider the growth rate of the smallest share as it is assumed to be less contaminated by measurement errors.

[11] Assuming that the share s_{2005} is also affected by measurement error would actually increase the measurement error we need on s_{1974} to reproduce the convergence patterns, as it would reduce its effect on the growth rate (given that s_{2005} is at the numerator).

ment error is large compared to the small variance of the budget shares in each category (the highest budget share is never more than twice the average budget share in 1974). Additionally, this is a very specific case of measurement error; other patterns would not produce a spurious convergence.

The second issue, mean reversion, is a more difficult problem to tackle. The observed convergence can be a simple return to past homogenization in consumption. It could be that consumption was homogenized in the 50's, before diverging and then converging. France is, however, a country with large historical differences in food cultures. The divide of oil versus butter consumption is an example of such persistent differences which we can observe in our data (see Figure 1) as well as historical maps such as a map of fat consumption in rural France in 1952 (see Appendix Figure A.1).

3.2 Unconditional Convergence in Prices and Income

Two obvious candidates to explain the convergence in consumption patterns across departements are price and income convergence. Both factors are potential consequences of economic integration. First, trade may induce relative prices to converge across departements, which, according to Stigler and Becker (1977), could very well predict a convergence in consumption patterns over a significant period of time. We indeed find that prices converged for all food categories over the period, as shown in the Appendix Figure C.3.1. As above, the convergence in prices (unit values) is measured as the relationship between the growth rate from 1974 to 2005 and the initial 1974 unit value.

Second, economic integration may induce income convergence across departements. If preferences are non-homothetic with respect to income, the initially poorer departements may get relatively richer and therefore start consuming more like the richer departements. We see in Appendix Figure C.3.2 that this is the case for France over the

period: initial poorer departements have a much higher growth rate than richer ones over the period.

These stylized facts call for an empirical analysis flexible in prices and income in order to identify a residual effect of economic integration on local tastes. We should therefore consider a demand system allowing for price substitution and non-homotheticity with respect to income to account for the change in the economic environment following integration. Only then could we potentially capture the effect on local tastes aside from the traditional economic channels.

4 Tastes and Convergence

4.1 First Step: Estimating Tastes

We identify tastes as the departement differences in demand once accounting for income, prices and household characteristics. Following a recent trend in the trade literature (Feenstra, 2010, Atkin, 2013 Fajgelbaum and Khandelwal, 2016, Hummels and Lee, 2018, Liu and Meissner, 2017), we use the Almost Ideal Demand System (AIDS, Deaton and Muellbauer, 1980) to capture tastes. Our primary motivation for adopting this approach is a practical one: the AIDS expenditure function is a second-order approximation to any arbitrary expenditure function. It allows for both flexibility in cross-price elasticities between products and non-homotheticity. Moreover, the AIDS expenditure function generates a demand system in which tastes are additively separable from price and income effects, which is very useful given limited amounts of data.

While this demand estimation approach offers functional form flexibility, its application poses one challenge. Demand systems in the product space cannot deal with a

varying number of products.[12] Focusing on food renders the problem less severe because food products evolve more slowly than other products and most of them are consumed in both periods (1974 and 2005). To reduce the challenge of entry and exit of products, we aggregate food products in two levels: the higher level corresponds to the allocation of food expenditures into broadly defined categories of food, such as grains, meats, and fats (see Table 1). We index the higher category level by b (a mnemonic for "broad"). At the lower level, we consider various goods within each board category, such as chicken, beef, or mutton in the meats category. We index the lower category level by g (a mnemonic for "good"). We employ the AIDS to estimate demand at both food levels $l = \{b, g\}$.

Following Atkin (2013), we use a version of the AIDS expenditure function which allows the first-order price terms to vary across departements. The resulting function defines the minimum expenditure $\ln e(u, \mathbf{p}_{h,l}; \Theta_{d,l})$ for household h to attain a specific u utility level at a given vector $\mathbf{p}_{h,l}$ of prices $p_{h,l}$. $\Theta_{d,l}$ is a vector of tastes $\theta_{d,l}$, which are identical across households within a departement d for a food item $l = \{b, g\}$:

$$\ln e(u, \mathbf{p}_{h,l}; \Theta_{d,l}) = \alpha_0 + \sum_l \theta_{d,l} \ln p_{h,l} + \frac{1}{2} \sum_l \sum_{l'} \gamma_{ll'} \ln p_{h,l} \ln p_{h,l'} + u\beta_0 \prod_l p_{h,l}^{\beta_l}, \quad (1)$$

where $p_{h,l}$ is the price of item $l = \{b, g\}$, and $\theta_{d,l}$, β_l, and $\gamma_{ll'}$ are parameters.[13]

Using Shephard's lemma and appropriate substitutions, we first derive from equation (1) the demand functions in budget shares at the broad category level, $l = b$, depending on log prices, log real expenditure functions and a good-departement specific constant:

$$s_{h,b} = \theta_{d,b} + \sum_{b'} \gamma_{bb'} \ln p_{h,b'} + \beta_b \ln \left(\frac{X_h}{P_h} \right), \quad (2)$$

[12] The AIDS was typically developed with broad product categories in mind, which are consumed by all consumers at every period (Chaudhuri et al., 2006).

[13] These parameters satisfy the following restrictions: $\sum_l \theta_{d,l} = 1$ (adding up), $\sum_l \gamma_{ll'} = \sum_l \beta_l = 0$ (homogeneity) and $\gamma_{ll'} = \gamma_{l'l}$ for all l, l' (symmetry).

where $s_{h,b}$ is the budget share of broad category b in total food budget, and X_h / P_h represents the real household expenditure with X_h the total food expenditure and P_h the AIDS price index. Note that β_l governs the strength of non-homotheticity.

Several challenges arise for the identification of equation (2). First, French household surveys, as most surveys, collect expenditure and quantity for each good. We therefore use unit values (expenditure divided by quantity). They are, however, biased by an endogenous choice of quality. We proxy prices by median unit values for each product at the lowest geographical level of analysis, the city.[14] Another challenge is the endogeneity of total expenditure: first, the budget spent on each food product and the total food expenditure are simultaneously decided. Second, any measurement error on food expenditure would also affect the left-hand side[15]. Both issues are taken care of by instrumenting total expenditure by household income.[16] Finally, other household characteristics may influence demand and affect our estimates of the taste parameters $\theta_{d,b}$. We follow Deaton and Subramanian (1996) by including demographic controls (fraction of people by age and gender, occupation of the adults, and log of number of people). The type of store in which the household purchases the product significantly varies over time and space, so we also include the fraction of purchase in different types of store (big store, mini-mart, small retailer) by household in the controls.

Starting from equation (2), we estimate the demand of household h for broad category b living in city c in departement d in BDF survey round t (1974 or 2005):

$$s_{ht,b} = \theta_{dt,b} + \mathbf{\Pi Z}_{ht} + \sum_{b'} \gamma_{bb'} \ln P_{ct,b'} + \beta_b \ln \left(\frac{X_{ht}}{P^{\star}_{ct}} \right) + \epsilon_{ht,b}, \tag{3}$$

[14] Median city prices impart less measurement errors and are less contaminated by household choice and quality effects (Atkin, 2013).

[15] The time in which the survey registers expenditure is short and generates errors, for example zero values for goods consumed at wider intervals, or large values for stored goods.

[16] Household income is the most common instrument used by the literature, justified by an intertemporal weak separability assumption (Robin, 1999).

where $s_{ht,b}$ is the budget share of broad category b spent by household h in the food budget. Our parameter of interest $\theta_{dt,b}$ is a broad category-by-departement-by-year fixed effect. It constitutes our taste estimate and acts as a pure budget share shifter capturing the local (departement) component of food budget share that cannot be explained by the vector of prices or real expenditure.[17] $\ln P_{ct,b'}$ is the log median price of broad category b' in city c (in departement d). $\frac{X_{ht}}{P^{\star}_{ct}}$ is the real food expenditure with X_{ht} total food expenditure (instrumented by income) and $P^{\star}_{ct}$ the Stone price index per city c for broad category b.[18] $\mathbf{Z}_{ht}$ is the vector of household characteristics described above, and $\epsilon_{ht,b}$ is the error term.

Turning to the lower level of consumptions of detailed goods, the demand of household h for good g living in city c in departement d in BDF survey round t (1974 or 2005) is:

$$s_{ht,g} = \theta_{dt,g} + \mathbf{\Pi Z}_{ht} + \sum_{g'} \gamma_{gg'} \ln p_{ct,g'} + \beta_g \ln \left(\frac{X_{ht,b}}{P^{\star}_{ct,b}} \right) + \epsilon_{ht,g}, \tag{4}$$

where $s_{ht,g}$ is the budget share of good g spent by household h within broad category b, $\theta_{dt,g}$ is a good-by-departement-by-year fixed effect, $\ln p_{ct,g'}$ is the log median price of good g' in city c (in departement d) and $\frac{X_{ht,b}}{P^{\star}_{ct,b}}$ is the real household expenditure in broad category b with $X_{ht,b}$ the broad category expenditure and $P^{\star}_{ct,b}$ the Stone price index per location c for broad category b of good g (e.g., butter in fat). $P^{\star}_{ct,b}$ is also the price of category b used at the higher category level in equation (3). $\mathbf{Z}_{ht}$ is the vector of household characteristics described above, and $\epsilon_{ht,b}$ is the error term.

[17] Atkin (2013) notes that three assumptions are required in order to identify the departement tastes: first, there must be a price variation within each departement to identify the common demographic, price, and income (expenditure) effects, $z_c(\mathbf{Z}_h, \mathbf{p}_h, \frac{X_h}{P_h})$. Second, the $z_c(.)$ function should be common across France and well approximated by our functional form. Third, the within-departement price variation must be driven by supply shocks.

[18] The Stone price index is a linear approximation of the AIDS price index $P_{h,b}$ (Deaton and Muellbauer, 1980; Nevo, 2011).

We use Two-Stage Least Squares (2SLS)[19] and Iterated Linear Least Squares (ILLS) (Blundell and Robin, 1999) to estimate equations (3) and (4).[20] The 2SLS, which is our baseline specification, introduces more flexibility in the variables we use to estimate the demand for each category. The ILLS takes into account the demand system structure of the optimization problem.[21] The results do not appear to be sensitive to the estimator used. We discuss in Section 5 how the supply environment may influence our taste estimates aside from this specification (varieties, quality and price measurement).

4.2 Second Step: Convergence

From the AIDS estimations, we back up the set of fixed effects $\widehat{\theta}_{dt,l}$ for each item $l = \{b, g\}$. They represent our taste parameters, that is the residual differences across departement d, food level $l = \{b, g\}$ and year $t = \{1974, 2005\}$, after taking into account price, income and demographic characteristics. Armed with these taste estimates we can answer the following questions: Are tastes localized? Do they decay with geographic distance? And does the distance decay shrink over time?

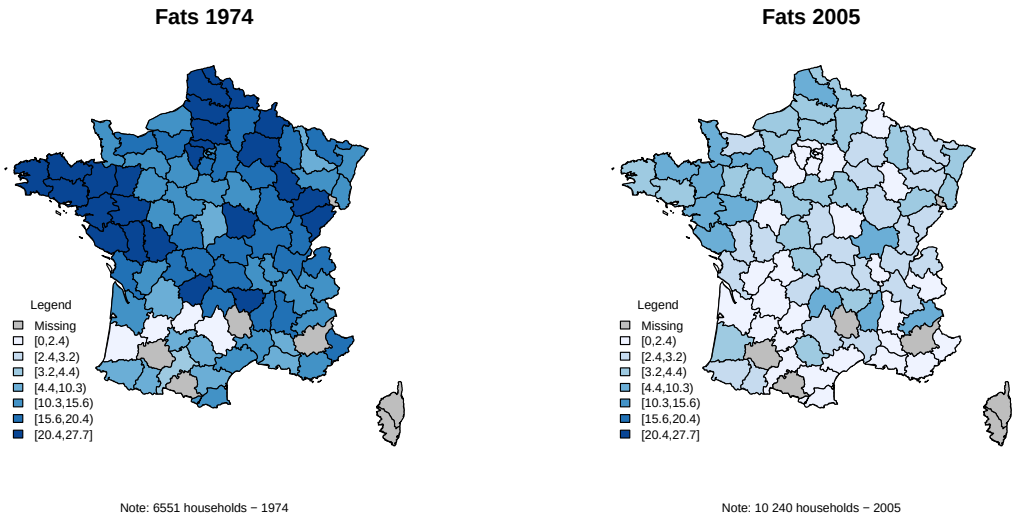
4.2.1 Are Tastes Localized?

A visualization of the taste estimates may help answering this question. Figure 2 plots the departement fixed effects from the AIDS estimations in 1974 (left) and 2005 (right), for one food category, fats (see Appendix B for the 9 categories). The estimated taste parameters are represented in bins. The darker the departement, the larger the taste for fats (controlling for prices, incomes, and households characteristics). Both years show differences across departments coherent with the idea of localized tastes. This localization

[19] Total food expenditure is instrumented by household income in all specifications.
[20] Estimated using the program of Lecocq and Robin (2015).
[21] Notably, the simultaneous choice among all categories. It also allows to add the theoretical constraints (adding-up, homogeneity and symmetry) to the estimation.

appears to be spatially diffused across neighboring departements. For instance, tastes for fats are relatively larger in Brittany (West part of France) or in the North. This pattern is also in line with the one depicted in Figure 1, which represents the (unconditional) budget shares devoted to butter. Tastes appear to be localized not only for fats but also across the 9 categories of food, as shown in Appendix B.

Figure 2: Estimated Tastes on Fats by Departement, 1974 vs 2005



Notes: Graphs plot the departement fixed effects from the AIDS estimations on fats for 1974 (left) and 2005 (right). The estimated taste parameters are represented in bins. Appendix B reports the same graphs for all the 9 food categories.

We observe for fats and all the categories that tastes are more pronounced in 1974 than in 2005. This pattern suggests that tastes may have evolved over time.

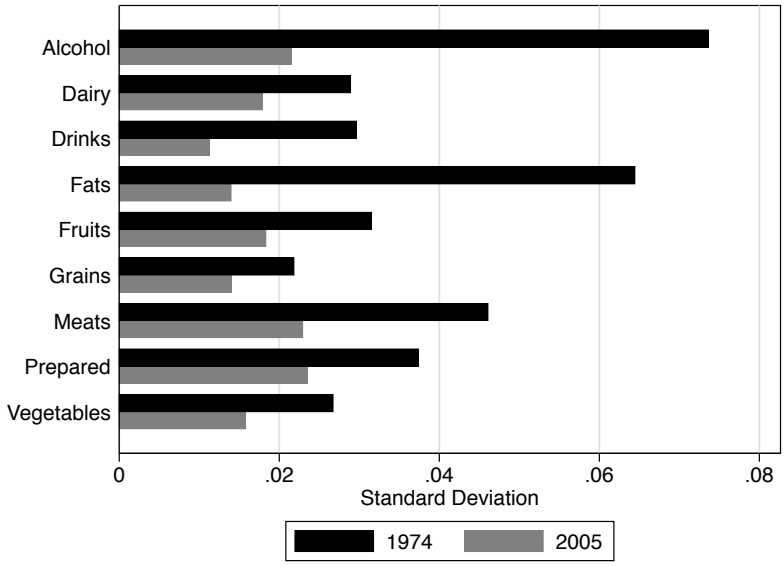
4.2.2 Do Tastes Decay with Geographic Distance and Time?

To explore the idea that tastes may have evolved across departements and time, we use the taste estimates to construct a bilateral taste distance $\Theta_{ijt,l}$ between any two departements i and j at year t for each food level $l = \{b, g\}$:

$$\Theta_{ijt,l} = |\widehat{\theta}_{it,l} - \widehat{\theta}_{jt,l}|. \tag{5}$$

Using this variable, we check whether taste distance varies with time and geography. First, we examine how the variance of bilateral taste distances, $\Theta_{ijt,l}$, changes over food product l and time t. Figure 3 reports the standard deviations of taste distances between all pairs of departements for each survey (1974 versus 2005) and each broad category of food. We observe that the variance of bilateral taste distances has decreased for all categories except prepared food – a category which is arguably more heterogeneous and more consumed nowadays than thirty years back. The variance decreased by half or more for alcohol, drinks, fat, fruits, meats. As a first evidence of a reduction in taste distances across departements over time, this fact implies that French departements differ less in their taste in 2005 than in 1974.

Figure 3: Standard Deviation of Bilateral taste distances, 1974 vs 2005



Notes: This figure depicts the standard deviations of taste distances $\Theta_{ijt,b}$ between all pairs of departements for each survey (1974 versus 2005) and each broad category of food.

To better explore the evolution of taste distances, we need to control for systematic differences across periods, but also across departements and food products.[22] These sys-

[22]Such systematic differences may be due to differences in supply, transport accessibility, openness to trade, internal or external migration, health or advertisement campaigns, or contiguity to a foreign country.

tematic differences could influence tastes by affecting each department and category of food differently, and especially at different time periods. Inspired by the structural trade gravity estimations, we regress our vector of bilateral taste distances on a vector of bilateral geographic factors along with a rich set of fixed effects capturing the systematic differences across departements, food categories and time. We start our investigation by focusing on the broad categories of food demand $c = b$:

$$\ln \Theta_{ijt,b} = \chi_{it,b} + \chi_{jt,b} + \gamma \text{Contiguity}_{ij} + \beta \ln \text{Distance}_{ij} + \delta \ln \text{Distance}_{ij} \times 2005 + \varepsilon_{ijt,b}, \tag{6}$$

where $\Theta_{ijt,b}$ is the taste distance between two departements i and j at year t for item b, $\chi_{it,b}$ and $\chi_{jt,b}$ are monadic departement-by-year-by-broad category fixed effects. They absorb *all* time-, product- and departement-varying monadic factors that may not be properly accounted for in the demand estimation. In other words, they capture any systematic difference across departements, products and years that may influence tastes. Contiguity_{ij} is a dummy variable equal to 1 if departements i and j are contiguous; $\ln \text{Distance}_{ij}$ is the log of geographic bilateral distance in kilometers between departements i and j. The geographic variables partly capture the effect of economic integration: a decrease of the effect of geographical distance on taste distance over time, captured by the interaction $\ln \text{Distance}_{ij} \times 2005$, would indicate a reduction in taste distance.[23] $\varepsilon_{ijt,b}$ is the error term.

Table 4 reports the estimation of equation (6) at the broad category level. Columns 1 and 2 use the baseline taste parameters $\hat{\theta}$ from our 2SLS AIDS estimation to construct the taste distances $\Theta_{ijt,b}$.[24] Our first result is that geographical distance is positively correlated with taste distance across departements. Column 1 of Table 4 shows a positive and highly

[23] As documented in Section 2.2, from 1974 to 2005, France underwent a significant economic integration (Combes and Lafourcade, 2005), following the development of high speed trains and highways that improved dramatically the ability to move people, ideas, goods, and services across French departements.

[24] Recall that total food expenditure is instrumented by household income.

significant effect of distance for both years (here the interaction term $\ln \text{Distance}_{ij} \times 2005$ is omitted). Tastes decay with geographic distance: a 10% increase in geographic distance would increase taste distance by about 1%. Intuitively, the more geographically distant the departements the stronger the taste distance: going from Lyon to Marseille increases the taste distance with Paris by 7.2%.[25] In the same vein, contiguity is negatively correlated with taste distance across departements: contiguous departements have a 7% ($= [\exp(\hat{\gamma}) - 1] * 100$) lower bilateral taste distance. These results confirm that tastes are localized in France, even when controlling for the economic environment, such as the influence of prices, income and demographics (from the first step) and the time-varying monadic factors with departement-by-year-by-broad category fixed effects.

The second and central result is that the effect of geographical distance decreases in 2005: tastes converge over time. This result is given by the estimation of the interaction between geographical distance with a year fixed effect for 2005 ($\ln \text{Distance}_{ij} \times 2005$ in equation 6). The key null hypothesis is that the effect of the bilateral geographic distance on the bilateral taste distance is identical in 1974 and 2005. This is stated as $H_0 : \delta = 0$, which means that the distance decay has the same impact on taste in both periods. Column 2 of Table 4 shows that $\widehat{\delta}$ is negative and significantly different from zero, suggesting a reduced impact of the distance decay in 2005. The distance semi-elasticity depicted at the bottom of column 2, for both years separately, show indeed a much lower distance effect in 2005 than in 1974. The geographic distance estimates in 2005 has been more than halved compared to 1974. Column 3 confirms the robustness of these results to the estimation of the taste parameters by the AIDS ILLS estimator in the first step.

[25] Marseille (capital of departement 13) is 270km away from Lyon (capital of departement 69) and 661km from Paris.

Table 4: Taste and Distance Decay - Broad Categories

	$\ln \Theta_{ijt,b}$		
	Baseline		ILLS
	(1)	(2)	(3)
Contiguity$_{ij}$ (γ)	-0.073^a	-0.073^a	-0.073^a
	(0.024)	(0.024)	(0.024)
Ln Distance$_{ij}$ (β)	0.104^a	0.144^a	0.144^a
	(0.009)	(0.012)	(0.012)
Ln Distance$_{ij}$ x 2005 (δ)		-0.080^a	-0.080^a
		(0.016)	(0.016)
Observations	70488	70488	70488
Adjusted R^2	0.374	0.374	0.374
Fixed Effets:			
Departement$_i$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Departement$_j$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Ln Distance$_{ij}$ in 1974		0.144^a	0.144^a
		(0.012)	(0.012)
Ln Distance$_{ij}$ in 2005		0.064^a	0.064^a
		(0.012)	(0.012)

Notes: $\Theta_{ijt,b} = |\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|$ for departments i and j, broad category b and survey years $t = 1974, 2005$. $\widehat{\theta}$ is the estimated taste using unexplained departement variation in food budget shares from AIDS estimations. AIDS estimations were performed using Two-Stage Least Squares (2SLS) in columns 1 and 2 and Iterated Linear Least Squares (ILLS) in column 3. Standard errors are in parentheses clustered by departement pairs, with ^{a} and ^{b} denoting significance at the 1% and 5% level respectively.

4.2.3 The Non Linearity of Bilateral Taste Distances

Is the distance decay linear? Tastes could differ increasingly faster with geographical distance if cultural interactions fade with distance. We check this hypothesis by decomposing bilateral distance between departements in quartiles from below 244 kilometers to above 525 kilometers instead of using the log of geographic distance (and the contiguity dummy). Table 5 shows the results of this estimation with both years pooled (column 1) and each year separately (columns 2 and 3). We observe that the effect of geography on taste distance is stronger as geographic distance between departement pairs increases.

There is again a stark distance between 1974 and 2005: compared to the baseline category (below 244 km), the distance estimates are much stronger in 1974 compared to 2005.

Table 5: Taste and Step Distance - Broad Categories

	$\ln \Theta_{ijt,b}$ Baseline		
	(1) Both Years	(2) 1974	(3) 2005
Contiguity$_{ij}$ (γ)	-0.156^a	-0.190^a	-0.122^a
	(0.022)	(0.032)	(0.029)
244 to 380 km	0.057^a	0.104^a	0.009
	(0.013)	(0.018)	(0.017)
380 to 525 km	0.079^a	0.107^a	0.051^a
	(0.013)	(0.018)	(0.017)
above 525 km	0.143^a	0.209^a	0.077^a
	(0.014)	(0.020)	(0.020)
Observations	70488	35244	35244
Adjusted R^2	0.373	0.303	0.313
Fixed Effets:			
Departement$_i$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Departement$_j$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes

Notes: The dependent variable is $\ln \Theta_{ijt,b} = \ln(|\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|)$ for departments i and j, broad category b and survey years $t = 1974, 2005$. $\widehat{\theta}$ is the estimated taste using unexplained departement variation in food budget shares from AIDS estimations. Standard errors are in parentheses clustered by departement pairs, with ^{a} denoting significance at the 1% level. The excluded variable is less than 244 km.

4.2.4 Good Level Evidence of Taste Convergence

The patterns of distance decay and taste convergence highlighted for broad categories are also reproduced for goods within each category. We run equation (6) at the good level g for each of our 9 broad categories using good-specific taste parameters $\widehat{\theta}_{dt,g}$[26] to construct $\Theta_{ijt,g} = |\widehat{\theta}_{it,g} - \widehat{\theta}_{jt,g}|$.

Table 6 reports the estimates of geographic distance for both years and each of our

[26]Good-specific taste parameters are the results of the AIDS estimation using 2SLS. The patterns are robust and not significantly different when using the ILLS estimator.

Table 6: Taste and Distance Decay: Good Level

	Both Periods	1974	2005	# obs
	(1)	(2)	(3)	(4)
1. Alcohol	0.094[a]	0.128[a]	0.059[a]	41,830
	(0.012)	(0.016)	(0.015)	
2. Grains	0.014	0.018	0.010	33,464
	(0.013)	(0.17)	(0.17)	
3. Dairy	0.057[a]	0.112[a]	0.001	33,464
	(0.013)	(0.016)	(0.017)	
4. Drinks	0.081[a]	0.077[a]	0.084[a]	33,464
	(0.013)	(0.017)	(0.017)	
5. Fats	0.070[a]	0.055[a]	0.084[a]	33,464
	(0.013)	(0.020)	(0.018)	
6. Fruits	0.033[a]	0.056[a]	0.008	41,830
	(0.012)	(0.015)	(0.015)	
7. Meats	0.088[a]	0.126[a]	0.048[a]	75,294
	(0.009)	(0.011)	(0.011)	
8. Prepared	0.041[a]	0.030[a]	0.053[a]	58,562
	(0.009)	(0.012)	(0.013)	
9. Vegetables	0.048[a]	0.054[a]	0.041[a]	41,830
	(0.012)	(0.015)	(0.016)	

Notes: The table only reports the estimates of the geographic distance effect. The contiguity dummy and departement$_i$-year$_t$-good$_g$ and departement$_j$-year$_t$-good$_g$ fixed effects are introduced in all regressions. The variation in observations (column 4) depends on the number of goods included within each food category (see Table 1). The dependent variable is $\ln \Theta_{ijt,b} = \ln(|\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|)$ for departments i and j, good g and survey years $t = 1974, 2005$. $\widehat{\theta}$ is the estimated taste using unexplained departement variation in food budget shares from AIDS estimations. Standard errors are in parentheses clustered by departement pairs, with [a] denoting significance at the 1% level.

nine food categories conditioning on the contiguity dummy, departement$_i$-year$_t$-good$_g$ and departement$_j$-year$_t$-good$_g$ fixed effects.[27] First, we observe a distance decay within each category (except for grains): geographic distance positively affects taste distances across departements, food products and time. Second, for 4 categories, the distance decay is significantly lower in 2005 than in 1974 (alcohol, dairy, fruits, and meats). Third, in both periods, distance estimates appear naturally higher in highly cultural categories of food

[27] Other estimates are not included for the sake of brevity but are available upon request.

in France, such as drinks, fats or alcohol (e.g. products such as butter, olive oil or wine).

5 A Supply Side Story?

Overall, the results depicted in section 4 show evidence of a convergence in food consumption in France between 1974 and 2005. The interpretation in terms of convergence in tastes is linked to the fact that our first stage estimates purge demand for a given food item from the effects of changing prices and incomes. There might however be other supply-side factors that can explain the convergence in consumption patterns that we see in the data. In this section, we explore supply-side effects related to the number of varieties, the introduction of new goods, quality issues and pricing strategies. Our analysis focuses on the broad category level.

5.1 Variety Effects

Variety effects bring two concerns related to each step of our empirical strategy. In step 1, our taste estimates may not derive from local taste but instead from differences in the local availability of varieties. In step 2, departements may converge in consumption because, other things being equal, they share more similar baskets of products in 2005 than in 1974. We address these concerns by using detailed information on the product type (brand, characteristics) contained in the BDF household surveys.

What is a variety? Previous work has not answered this question with a unified voice (see Broda and Weinstein, 2006). As in many papers, our definition is driven by data availability. In our setting a good is a particular product in a broad category, e.g., butter in fats. A variety, however, constitutes a particular type of butter, e.g., salted butter. Following this general principle, we define the number of varieties available in two different

ways. The first definition (*definition #1*) considers that a variety of a good g is available if it has been consumed at least once in a given location and year. The second definition (*definition #2*) is broader. It considers that if a variety has been consumed once in a particular store in a city, say Carrefour in Toulouse, it was indeed available in all the same stores in the departement, say all Carrefours in Haute-Garonne (Toulouse's departement).

Varieties in the First Step

We start with concerns about supply-side effects in the first step. The number of available varieties may typically affect demand through the different choice sets that consumers in different locations face. Controlling for the number of varieties in the first step allows us to check whether the convergence in taste estimates is not simply driven by the fact that consumers across the country have more choices commonly available in 2005 compared to 1974. We employ two strategies to introduce the number of varieties in the first step: a reduced form and a structural approach.

The first strategy takes into account the number of varieties in a reduced form manner by adding them directly as regressors in the estimation of the AIDS equation (3).[28] For each demand equation, we introduce both the log of the number of varieties of the own broad category and all the 8 others categories to capture a cross-variety effect similar to the cross-price effect.[29]

[28]The consumed product and the type of store are described with more details in 2005 than in 1974. For instance, in 1974, we know if the product has been bought in a big store, a mini-mart, or a small retailer. In 2005, the name of the store is also available when reported. Our two definitions of variety are thus more precise in 2005, the year for which it is crucial to check whether the lower geographic distance effect is due to a different number of varieties available.

[29]From equation (3), we estimate:

$$s_{ht,b} = \theta_{dt,b} + \mathbf{\Pi Z}_{ht} + \sum_{b'} \gamma_{bb'} \ln P_{ct,b'} + \sum_{b'} \zeta_{bb'} \ln V_{ct,b'} + \beta_b \ln \left(\frac{X_{ht}}{P^{\star}_{ct}} \right) + \epsilon_{ht,b},$$

where $\ln V_{ct,b'}$ is the log of the number of varieties of broad category b' in city c (in departement d) in year t. To avoid any potential endogeneity between the household consumption share and the city's number of

The second strategy adopts a more structural approach. We consider an additional demand level, called the variety level, that captures demand for specific varieties. Our structure comprises now a broad category level as the highest level (say fat), a middle level that captures demand for specific goods (say butter), and a lower level that represents demand for particular varieties (say salted butter). We also model the demand for varieties using the AIDS framework. The lowest level of demand allows us to compute price indexes then used at the middle (good) level. The advantage is that this new structure takes into account that prices at the good level are lower when more varieties are available (Nevo, 2011). In practice, we compute a Stone price index of varieties for each good as a linear approximation of the AIDS price index.[30] We only use the variety definition 1 for this strategy, as we do not observe the reservation price of a variety not consumed in a city (needed for definition 2).

We employ both strategies to estimate the first step. Then, we use the obtained departement taste estimates to compute the new bilateral taste distance ($\Theta_{ijt,b} = |\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|$) for any pair of departements. Finally, we re-estimate the second step equation (6) in Table 7. Columns 1 and 2 use the variety definitions 1 and 2 respectively. Accounting for the number of varieties in step 1 does not seem to affect the convergence results compared to the baseline (see column 2 of Table 4). In other words, omitting to control for varieties does not make the departements much closer in terms of tastes. The distance semi-elasticities, reported at the bottom of Table 7, are remarkably similar to the baseline column 2 of Table 4. Moreover, the difference between 1974 and 2005 is still economically and statistically highly significant.

Column 3 of Table 7 uses the bilateral taste distance resulting from using varieties to

varieties, we remove for each household its own consumed number of varieties from the city's number of varieties.

[30] The price of each good $p_{ct,g'}$ in equation (4) is now the city Stone price index for each good based on the consumed varieties. It is then used to compute the price index of each broad category $P_{ct,b'}$.

Table 7: Taste, Distance Decay and the Number of Varieties (Step 1)

	Ln Varieties in Demand		Varieties in Price Index
	(1) definition #1	(2) definition #2	(3) definition #1
Contiguity$_{ij}$ (γ)	-0.052^b	-0.096^a	-0.032
	(0.024)	(0.024)	(0.023)
Ln Distance$_{ij}$ (β)	0.156^a	0.148^a	0.187^a
	(0.012)	(0.012)	(0.012)
Ln Distance$_{ij}$ x 2005 (δ)	-0.086^a	-0.091^a	-0.107^a
	(0.015)	(0.016)	(0.015)
Observations	70488	70488	70488
Adjusted R^2	0.400	0.392	0.330
Fixed Effets:			
Departement$_i$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Departement$_j$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Ln Distance$_{ij}$ in 1974	0.156^a	0.148^a	0.187^a
	(0.012)	(0.012)	(0.012)
Ln Distance$_{ij}$ in 2005	0.070^a	0.057^a	0.080^a
	(0.012)	(0.012)	(0.011)

Notes: The dependent variable is $\ln \Theta_{ijt,b} = \ln(|\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|)$ for departments i and j, broad category b and survey years $t = 1974, 2005$. $\widehat{\theta}$ is the estimated taste using unexplained departement variation in food budget shares from AIDS estimations. Columns 1 and 2 add the log of the number of varieties into the AIDS equations. Column 3 introduces an additional level of demand to construct a price index that accounts for the number of varieties. Columns 1 and 3 use variety definition 1 and column 2 uses definition 2 (see text for more details). Standard errors are in parentheses clustered by departement pairs, with ^{a} and ^{b} denoting significance at the 1% and 5% level respectively.

compute the price indexes. Compared to the baseline column 2 of Table 4, the estimate of the geographic distance is smaller in 1974 and somewhat larger in 2005. This result suggests that part of the reduction in taste estimates could be explained by the introduction of a more general demand structure that accounts for the variety level. Even then, the convergence story seems to hold with a geographic distance effect that represents in 2005 around one fourth of the level of 1974.

Shared Varieties in the Second Step

Beyond variety effects in the first step, a second concern may arise from the availability of *shared* varieties across departements. Indeed, we may observe a spurious convergence today because varieties of products that were only available in some departements in 1974, say butter in Brittany (West of France) and olive oil in Provence (South), are distributed in all departements in 2005. Following this line of reasoning, we would find evidence of local tastes in 1974 but not in 2005. In the second step, the departement-by-year-by-broad category fixed effects absorb differences in variety availability in each departement and year, but not the geographic component of shared availability.

To address this geographic concern, we need to capture the extent to which households in each departement pair share access to similar varieties. Our first measure is the probability that two individuals randomly drawn in departement i and departement j in year t consume the same variety, named *Variety Exposure*$_{ijt}$.[31] To check the sensitivity of our results, we use our two definitions of variety.

This measure, while capturing the availability of shared varieties, is limited to what the households report. The availability of varieties in a location arguably depends on the access to supermarket chains: people going to the same chain would be able to buy the same varieties of a product. We implement this intuition by employing an external dataset, obtained from Allain et al. (2017), which provides information on the complete set of supermarkets in France in 1974 and 2005 along with their exact location and surface area. Using this information, we compute a second measure, named *Supermarket Chain Exposure*$_{ijt}$, capturing the probability that two individuals randomly drawn in departement i and departement j in year t have access to the same supermarket chain.[32]

[31] This probability is constructed as the sum of the products of the population share consuming each variety by broad category and departement pair for each year.

[32] We compute the share of each supermarket chain in the total supermarket surface area by departement and year. Our bilateral measure is the sum of the products of these area shares by departement pair for

Table 8: Taste, Distance Decay, and Shared Varieties (Step 2)

	Varieties in Step 2		Supermarkets
	(1) definition #1	(2) definition #2	(3)
Contiguity$_{ij}$ (γ)	-0.073^a	-0.072^a	-0.070^a
	(0.023)	(0.023)	(0.023)
Ln Distance$_{ij}$ (β)	0.138^a	0.140^a	0.143^a
	(0.012)	(0.012)	(0.012)
Ln Distance$_{ij}$ x 2005 (δ)	-0.076^a	-0.075^a	-0.094^a
	(0.016)	(0.016)	(0.016)
Varieties Exposure$_{ijt}$	-0.017^a	-0.004^b	
	(0.003)	(0.002)	
Varieties Exposure$_{ijt}$ x 2005	0.009^b	0.002	
	(0.004)	(0.006)	
Supermarket Chain Exposure$_{ijt}$			-0.0635
			(0.125)
Supermarket Chain Exposure$_{ijt}$ x 2005			-2.352^a
			(0.617)
Observations	70488	70488	70488
Adjusted R^2	0.374	0.374	0.374
Fixed Effets:			
Departement$_i$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Departement$_j$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Ln Distance$_{ij}$ in 1974	0.138^a	0.140^a	0.143^a
	(0.012)	(0.012)	(0.012)
Ln Distance$_{ij}$ in 2005	0.062^a	0.064^a	0.049^a
	0.012	0.012	0.013

Notes: The dependent variable is $\ln \Theta_{ijt,b} = \ln(|\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|)$ for departments i and j, broad category b and survey years $t = 1974, 2005$. $\widehat{\theta}$ is the estimated taste using unexplained departement variation in food budget shares from AIDS estimations. Columns 1 and 2 add the variety exposure variables to equation (6), using variety definitions 1 and 2 respectively. Column 3 introduces the Supermarket Chain Exposure to equation (6). Standard errors are in parentheses clustered by departement pairs, with ^{a} denoting significance at the 1% level.

We estimate the second step equation (6) adding our bilateral measures of variety availability. Results are depicted in Table 8. Columns 1 and 2 add the bilateral variety exposure variable computed using our variety definitions 1 and 2. As expected, an increase

each year.

exposure to the same varieties decreases the bilateral taste distance between departement pairs. Interestingly, this is much less the case in 2005, in which this bilateral effect almost disappears for both definitions of varieties.

Column (3) adds the bilateral exposure to supermarkets to equation (6). In 1974, supermarket chains are smaller and less spread, while in 2005 the supermarket sector is much more concentrated with a few big supermarket chains over the territory. We thus expect the common supermarket exposure to decrease taste distances more in 2005 than in 1974. This is what we find in column (3): the effect of common supermarket chain exposure is not significant in 1974, while it is negative and significant in 2005. The bilateral supermarket chain exposure appears to decrease taste distances in 2005.

Even when introducing these two controls for bilateral variety availability, the distance semi-elasticities, reported at the bottom of Table 8, are similar to the baseline regression (see baseline column 2 of Table 4). While these added variables display an interesting effect on bilateral taste, they do not explain or reduce the convergence effect highlighted in the second step. In other words, the common availability of products cannot itself account for taste convergence over time.

5.2 Introduction of new products

Over this time period, market integration went largely beyond national borders with both the European integration process and globalization more globally introducing many new varieties in the consumption basket. Convergence could be affected by this introduction of new food cultures (think about the rise of retail food chains) and new products. As an example, consider the role of a new fat product imported from abroad, say foreign margarine, that competes with butter and olive oil. We can decompose its influence on taste convergence. First, if the product is introduced only in some departments, its influ-

ence would be well absorbed by our departement-year-product fixed effects in the second step. Second, if the introduction of the product is national, with a share of consumption in fats that is equal across departements, then this introduction would only moderately increase convergence. The reason is that taste would keep diverging because they are locally biased towards local preferred fats. Third, convergence in taste would be more important if the imported product systematically substitutes for the locally-preferred fat. The reason of this stronger convergence is that taste would be less locally biased. This last explanation of convergence cannot be completely ruled out but it should be systematic, valid for all the goods where convergence is documented (see Table 6) and not captured by the supply effects that we introduced.

5.3 Quality Effects

The taste parameters $\widehat{\theta}_{dt,b}$ are retrieved from our AIDS estimations after controlling for economic and socio-demographic characteristics. They could nevertheless be contaminated by quality effects. If the unobserved local quality drives a higher demand for certain goods, we would attribute to taste a shift in demand driven by the local supply of quality goods. For instance, butter could be of relatively higher quality in the North, so that a higher demand for butter in the North would reflect a better quality. We control for such quality effects in different ways. Second, differences in quality across departements could be reflected in differences in variety availability. If the variety of a product is available only with a high quality in departement i and at the same price only with low quality in departement j, then the taste distance between i and j would reflect this quality difference. So, conditioning on prices, it matters to control for the availability of varieties as in the previous section 5.1. Finally, the quality effect underlines the importance of including departement-by-year-by-broad category fixed effects in the second step. These

fixed effects account for differences in supply and quality for each food category product in each departement-year. With these fixed effects, equation (6) captures how proximity influences consumption patterns beyond differences in quality supply.

5.4 Price Measurement

An adequate measure of prices is crucial to the estimation of our taste parameters. Two potential issues may affect our results. The first one is a natural endogeneity concern: if the local taste for certain goods is relatively high and the local market not competitive enough, stores and supermarket chains may decide to strategically increase the price of the preferred local goods. This results in underestimated own price elasticities since a high price is associated systematically with unobserved taste for the concerned good, while goods with local distastes will be under-priced.

A popular solution to the price endogeneity issue is to instrument for local prices with proxies for cost shifters (prices of the same good in other markets, Hausman, 1996). In our setting, however, the instrumental variable approach would increase the taste estimate of the preferred products. Indeed, higher local prices for a product capture the local economic environment faced by the households. If we instrument the local prices by prices in other markets to better reflect production costs, the taste estimates $\widehat{\theta}_{dt,b}$ would be loaded by the difference between the production costs and the local prices. This would inflate our taste parameters. In the case where higher local prices do not simply reflect firm strategic behaviors, we would clearly overestimate our measure of local tastes.

Beyond firm strategic behaviors, price mismeasurement may also affect our second-step results. In the hypothesis in which our taste estimates partly reflect mismeasurement of prices in our data, the observed convergence could be driven by errors across surveys. A specific case that could affect our convergence story is if prices are more precisely mea-

sured in 2005 than in 1974. This specific mismeasurement pattern could lead to a spurious effect of geographic distance in 1974, which sharply decreases in 2005, only because of a difference in the quality of our price data.

We can get a sense of how prices affect our results, both if they are mis-measured or plagued by firms' strategic behavior, by omitting them in the AIDS estimation. Our thought experiment is that if mis-measured prices make our taste estimates larger, not controlling for them should worsen this bias. On the contrary, if prices are endogenous to taste and attenuate our taste estimates, not controlling for them would lead to smaller differences across departements and to a smaller convergence. This experiment is estimated in Table 9. **Column 1 documents that when we omit to control for prices in the first step,[33] we get *lower* taste estimates. These results are in line with the idea that the endogeneity of prices attenuates our taste estimates. As a consequence, the geographical distance elasticity in 1974 is only about 40% (=0.260/0.640) of its magnitude when we do control for prices (see column 2 in Table 4).**

In column 2, we omit to control for income in the first step.[34] We get taste estimates that do not appear to be statistically different from the benchmark estimates (see column 2 in Table 4). In column 3, we use unconditional taste estimates $\widehat{\theta}_{dt,b}$ delivered from a regression of budget shares $s_{ht,b}$ on the department-by-year-by-broad category fixed effects. The second step regression, depicted in column 3, offers two important insights. First, as in columns 1 and 2, the distance effect ($\widehat{\delta}$) is significantly smaller in 2005 than in 1974, in line with the convergence story. Second, as expected, controlling for the economic environment (prices, income, household characteristics) matters, otherwise unconditional taste estimates lead to a lower distance effect in 1974 and a higher one in 2005. Without

[33] Omitting to control for prices in the first step means that we do not introduce the terms $\sum_{b'} \gamma_{bb'} \ln P_{ct,b'}$ in equation (3).

[34] Omitting to control for income in the first step means that we do not introduce the term $\beta_b \ln\left(\frac{X_h}{P_h}\right)$ in equation (3).

Table 9: Tastes without Price, Income and Geography Controls - Broad Categories

	Without Prices	Without Income	Unconditional
	(1)	(2)	(3)
Contiguity$_{ij}$ (γ)	-0.035	-0.068^a	-0.016
	(0.023)	(0.023)	(0.023)
Ln Distance$_{ij}$ (β)	0.212^a	0.156^a	0.199^a
	(0.012)	(0.012)	(0.012)
Ln Distance$_{ij}$ x 2005 (δ)	-0.129^a	-0.0968^a	-0.0976^a
	(0.015)	(0.015)	(0.015)
Observations	70488	70488	70488
Adjusted R^2	0.349	0.388	0.330
Fixed Effets:			
Departement$_i$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Departement$_j$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Ln Distance$_{ij}$ in 1974	0.212^a	0.156^a	0.199^a
	(0.012)	(0.012)	(0.012)
Ln Distance$_{ij}$ in 2005	0.083^a	0.059^a	0.102^a
	(0.011)	(0.012)	(0.012)

Notes: The dependent variable is $\ln \Theta_{ijt,b} = \ln(|\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|)$ for departments i and j, broad category b and survey years $t = 1974, 2005$. $\widehat{\theta}$ is the estimated taste using unexplained departement variation in food budget shares from AIDS estimations. In column 1, we estimate the first step by omitting price controls. In column 2, we estimate the first step by omitting to control for income. In columns 3, we estimate the first step by simpling regressing the budget shares on the department-by-year-by-food category product fixed effects. Standard errors are in parentheses clustered by departement pairs, with ^{a} denoting significance at the 1% level.

these controls, the convergence would appear lower.

6 Taste, Migration and Media Exposure

If the observed convergence in taste is not fully explained by supply side elements, two other elements are likely to affect taste convergence over time: migration and media exposure.

First, internal migration could play a role in our observed taste convergence through

a pure composition effect:[35] for instance, if people from the North of France migrates to the South, they may bring with them their cultural preference for butter and hence we may capture a taste for butter in the South purely driven by the migrants from the North. There could also be an indirect effect through social interactions, for instance if the population in the South is influenced by the taste of the Northern migrants and starts consuming more butter. Could it be that migration explains our convergence results, and that geographic distance is only a proxy for this effect?

Second, media exposure could also explain part of the observed taste convergence. People exposed to the same media are exposed to the same advertisements and news. If people in adjacent departements had access to same newspapers in 1974, but that the newspaper networks widen in 2005, geographical distance could pick up exposure to the same media.

Migration effects are captured by constructing the variable $\text{Migration}_{ij,t}$, which is the average of the number of people born in departement j living in departement i and the number of people born in departement i living in departement j in Census year t.[36] The measure of media exposure, $\text{MediaExposure}_{ij}$, is constructed as the probability of reading the same newspaper in departement i and departement j. This probability is computed as the sum of products of shares of number of publications by newspaper for each departement pair.[37]

We re-estimate the second step equation (6) adding the migration and the media exposure variables. Table 10 shows that bilateral migration does not significantly explain

[35] The influence of foreign migration is well absorbed by the department-by-year-by-product fixed effects in the second step. They capture the fact that some departements could be more influenced than others by foreign migration, such as the most attractive departements or the foreign bordering locations.

[36] The number of people born in one departement living in an another one in 1974 and 2005 comes from the census data provided by INSEE.

[37] This variable is computed based on daily departement press figures on the number of publications per departement in 2005. Other years have been collected to compute a time-varying probability: 1979, 1980, 1985, 1990, 1995, 2000, 2011 and 2016. Source: ACPM (Alliance pour les chiffres de la presse et des medias).

Table 10: Taste, Migration, and Media Exposure

	Migration	Media	Both
	(1)	(2)	(3)
Contiguity$_{ij}$ (γ)	-0.030	-0.056^{b}	-0.015
	(0.028)	(0.024)	(0.028)
Ln Distance$_{ij}$ (β)	0.139^{a}	0.131^{a}	0.128^{a}
	(0.014)	(0.012)	(0.015)
Ln Distance$_{ij}$ x 2005 (δ)	-0.094^{a}	-0.069^{a}	-0.084^{a}
	(0.020)	(0.017)	(0.020)
Mean Migration Share in Population$_{ijt}$	-0.0161		-0.0138
	(0.011)		(0.011)
Mean Migration Share in Population$_{ijt}$ x 2005	-0.0123		-0.0155
	(0.014)		(0.014)
P(reading common regional press)$_{ij}$		-0.159^{a}	-0.163^{a}
		(0.044)	(0.044)
P(reading common regional press)$_{ij}$ x 2005		0.108^{c}	0.124^{b}
		(0.061)	(0.062)
Observations	70488	70488	70488
Adjusted R^2	0.374	0.374	0.374
Fixed Effets:			
Departement$_i$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Departement$_j$-Year$_t$-BroadCat$_b$	Yes	Yes	Yes
Ln Distance$_{ij}$ in 1974	0.139^{a}	0.131^{a}	0.128^{a}
	(0.014)	(0.012)	(0.015)
Ln Distance$_{ij}$ in 2005	0.045^{a}	0.063^{a}	0.043^{a}
	0.014	0.013	0.014

Notes: The dependent variable is $\ln \Theta_{ijt,b} = \ln(|\widehat{\theta}_{it,b} - \widehat{\theta}_{jt,b}|)$ for departments i and j, broad category b and survey years $t = 1974, 2005$. $\widehat{\theta}$ is the estimated taste using unexplained departement variation in food budget shares from AIDS estimations. Standard errors are in parentheses clustered by departement pairs, with ^{a} denoting significance at the 1% level.

bilateral tastes in both years while media exposure reduces the bilateral taste distance in 1974, but much less so in 2005. Interestingly, the estimates of β and δ vary from one regression to the other but the distance effect in 2005 is fairly similar to our benchmark result (see column 2 of Table 4). Overall, convergence in taste is robust to the introduction of variables measuring migration and media exposure.

7 Conclusion

This article estimates the convergence of food tastes in France in a context of deep economic integration. By doing so, we propose a method to disentangle the economic effect (prices and income convergence) from the cultural effect of economic integration in a two-steps analysis: first, estimating a flexible demand system which accounts for price and income effects and integrates taste shifters; second, building a bilateral taste distance across locations using the estimated taste shifters by product and location.

We find that food tastes have converged over time in France, as (1) the standard deviation of bilateral taste distances across departements has significantly reduced over time across products and (2) geographic distance is less associated with taste distance in 2005 than in 1974. In short, France has become culturally more homogenized.

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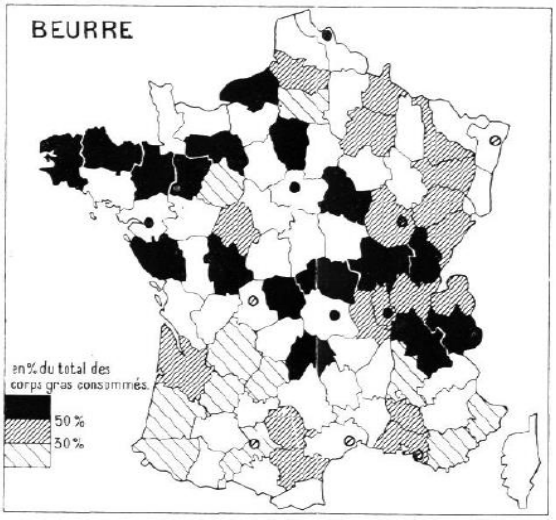
Appendix

A Localized Food Taste in France

France is characterized by persistent food cultures which differ across the territory. An example of these persistent differences is the divide in consumption of fat products: the North-West of France uses butter as a cooking fat, while the South-East of France uses olive oil. This divide is historical, as shown by the map of fat consumption in rural France in 1952 (see Figure A.1). The map is darker as the share of butter in total fat consumption increases, and clearly shows the North-West to South-East divide in fat consumption. Scholars consider the divide as extremely persistent: individuals acquire their entire food culture and practices using the same cooking fat, which provides a very strong taste for meals cooked this way (Febvre, 1961). In fact, three fourth of French people cite butter as a marker of local identity (Poulain and Basdevant, 2001).

Figure A.1: Fat Consumption among Farmers



Note: Map done by Lengellé, 1952 INSEE Survey, Hémardinquer (1961)

B Estimated Fixed Effects, 1974 vs 2005

Figure B.1: Estimated Departement Fixed Effects on Foood Products, 1974 vs 2005

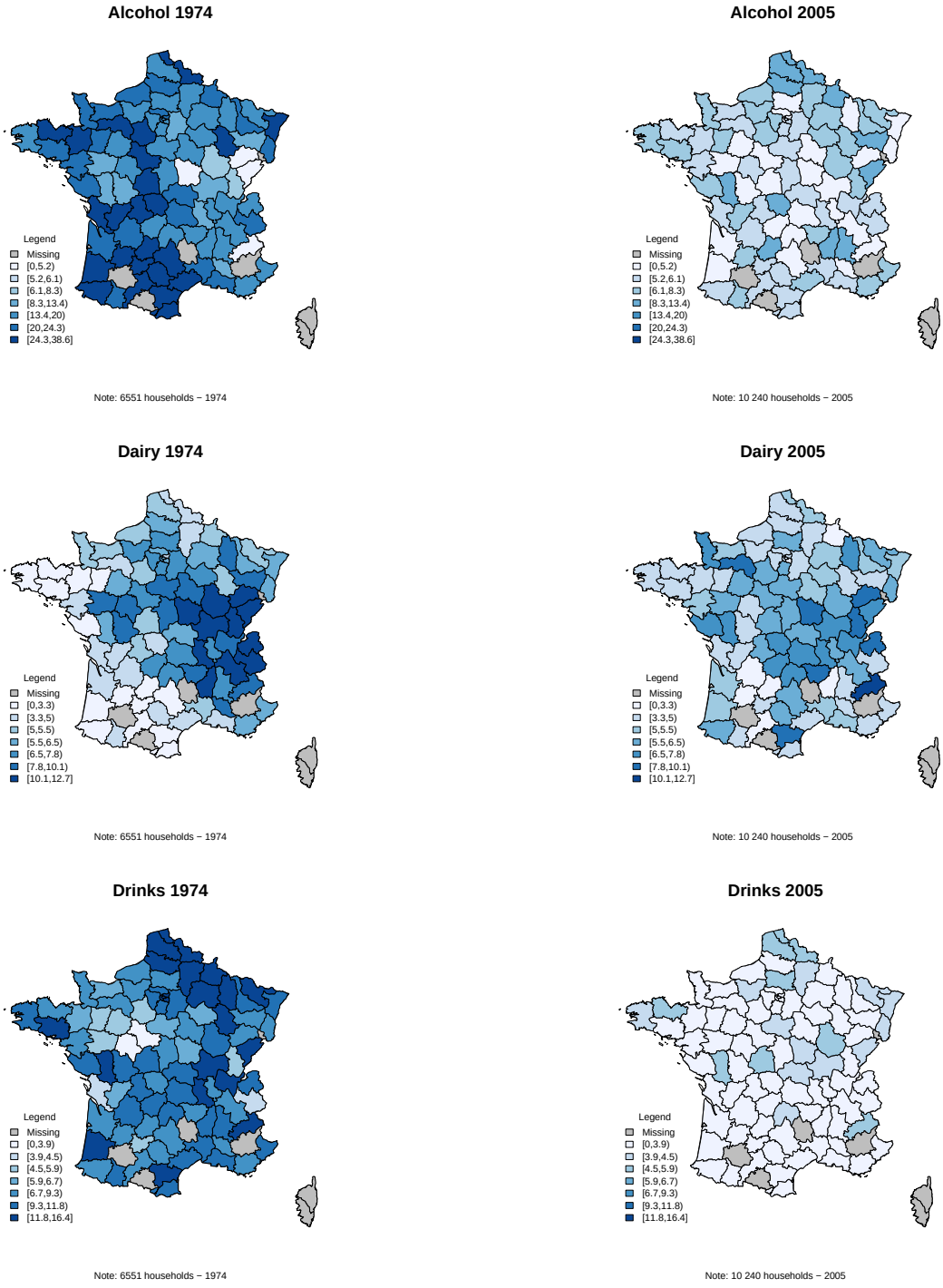
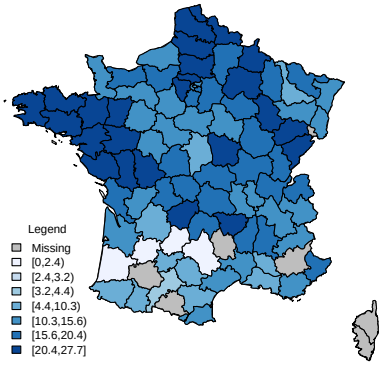


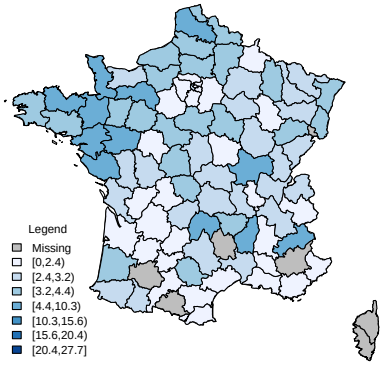
Figure B.1: Estimated Departement Fixed Effects on Food Products, 1974 vs 2005 (cont'd)

Fats 1974



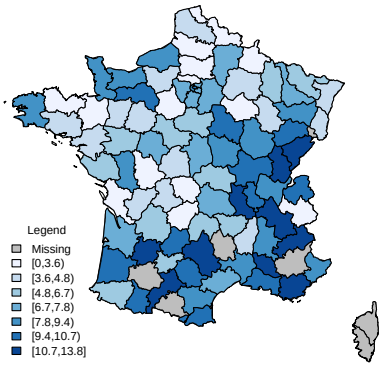
Note: 6551 households − 1974

Fats 2005



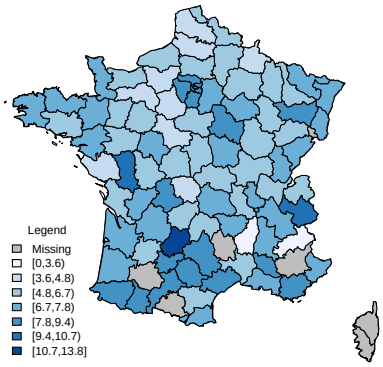
Note: 10 240 households − 2005

Fruits 1974



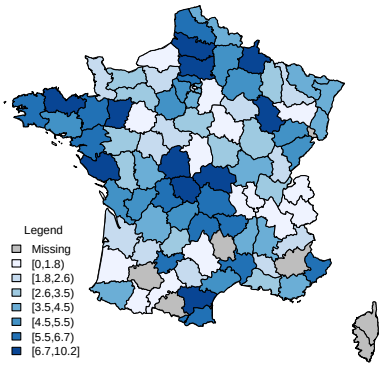
Note: 6551 households − 1974

Fruits 2005



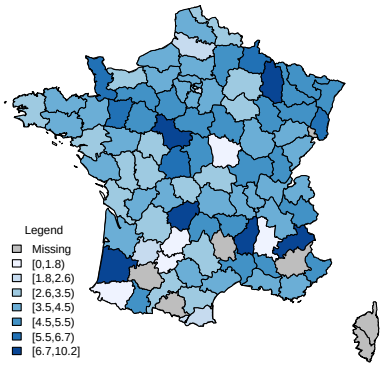
Note: 10 240 households − 2005

Grains 1974



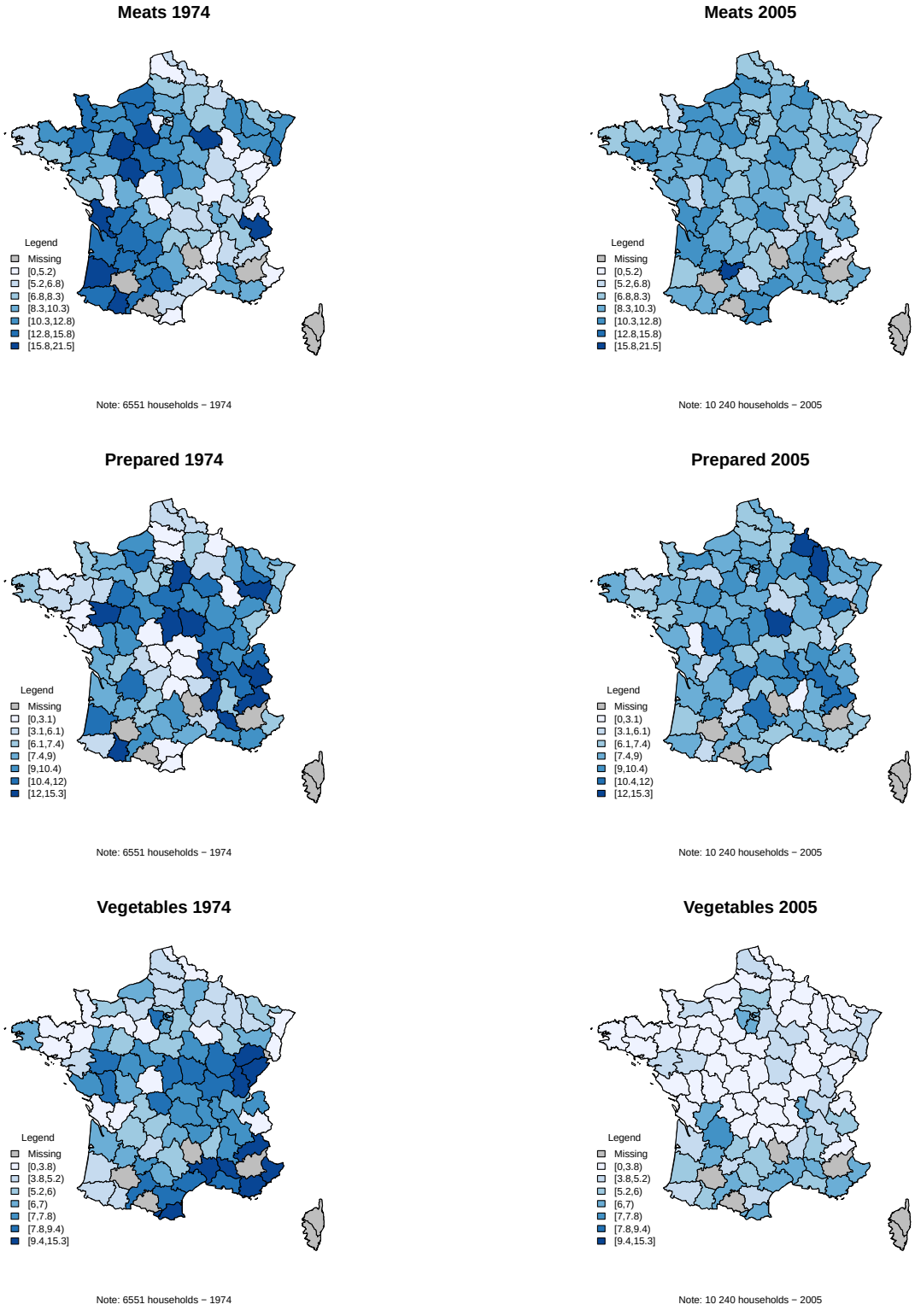
Note: 6551 households − 1974

Grains 2005



Note: 10 240 households − 2005

Figure B.1: Estimated Departement Fixed Effects on Food Products, 1974 vs 2005 (cont'd)



Notes: All graphs plot the departement fixed effects from the AIDS estimations on food categories for 1974 and 2005.

C Unconditional Convergence, 1974-2005

C.1 Unconditional Convergence of Budget Shares

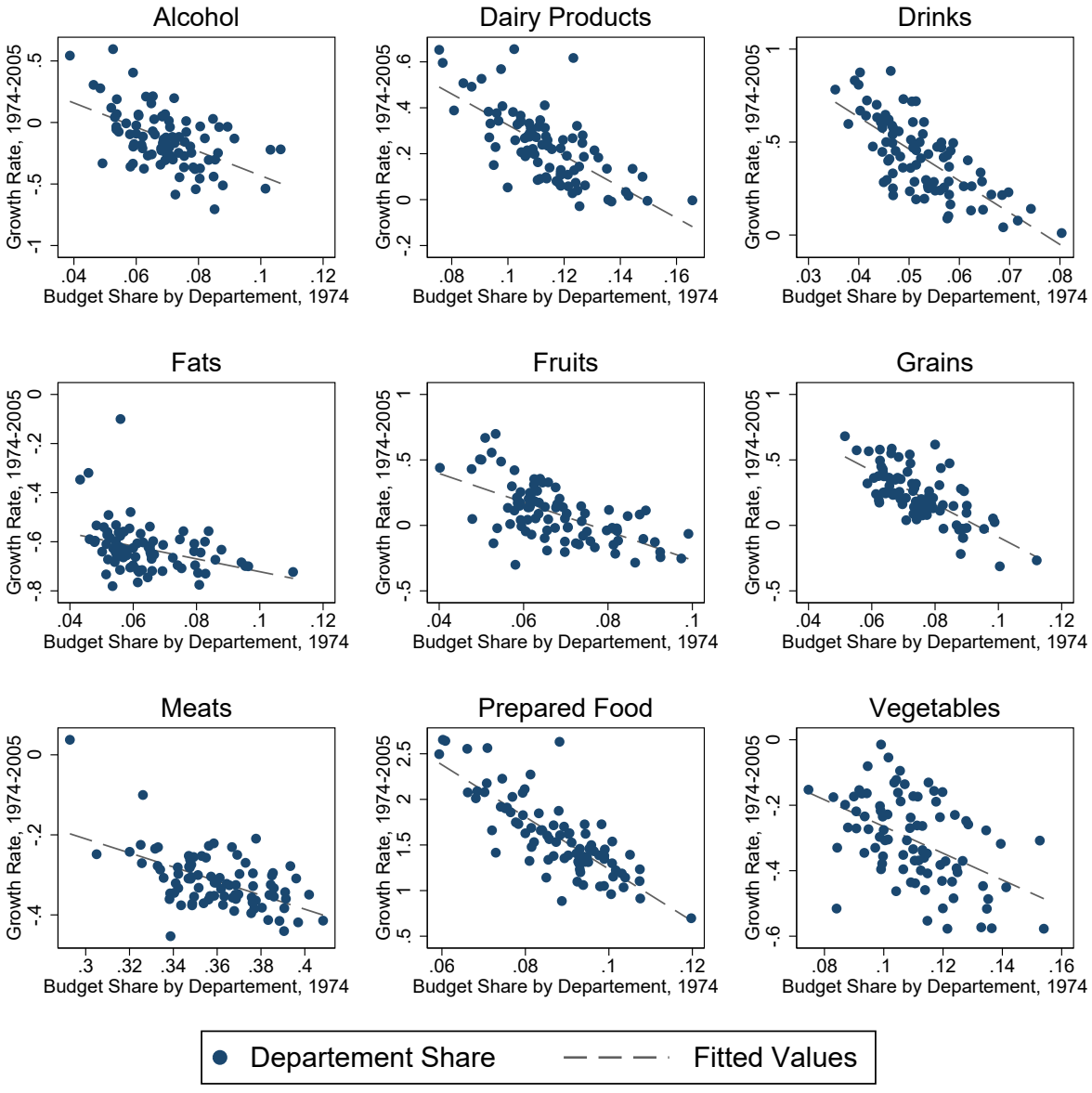


Figure C.1.1: Budget Share Convergence by Category, French Departments, 1974-2005

C.2 Testing Convergence: Counterfactual Measurement Errors

Table C.2.1: Counterfactual Measurement Errors in the Hypothesis of Non-Convergence

	Budget Shares					
	Mean		Maximum		Error on Initial Share	
Broad categories	1974	2005	1974	2005	Mean	Maximum
Alcohol	.07	.06	.11	.09	44%	89%
Dairy Products	.11	.14	.17	.2	37%	77%
Drinks	.05	.07	.08	.11	21%	59%
Fats	.06	.02	.11	.06	44%	69%
Fruits	.07	.07	.1	.11	26%	73%
Grains	.08	.09	.11	.13	27%	60%
Meats	.36	.25	.41	.36	34%	48%
Prepared Food	.09	.22	.12	.32	26%	53%
Vegetables	.11	.08	.15	.11	20%	55%

Note: This counterfactual analysis reproduces the measurements errors needed to obtain the convergence graphs of Appendix C.1 in case of no real convergence. We assign the growth rate of the smallest share to all French departements, assuming the smallest share is the least contaminated by measurement errors.

C.3 Unconditional Convergence of Prices and Income

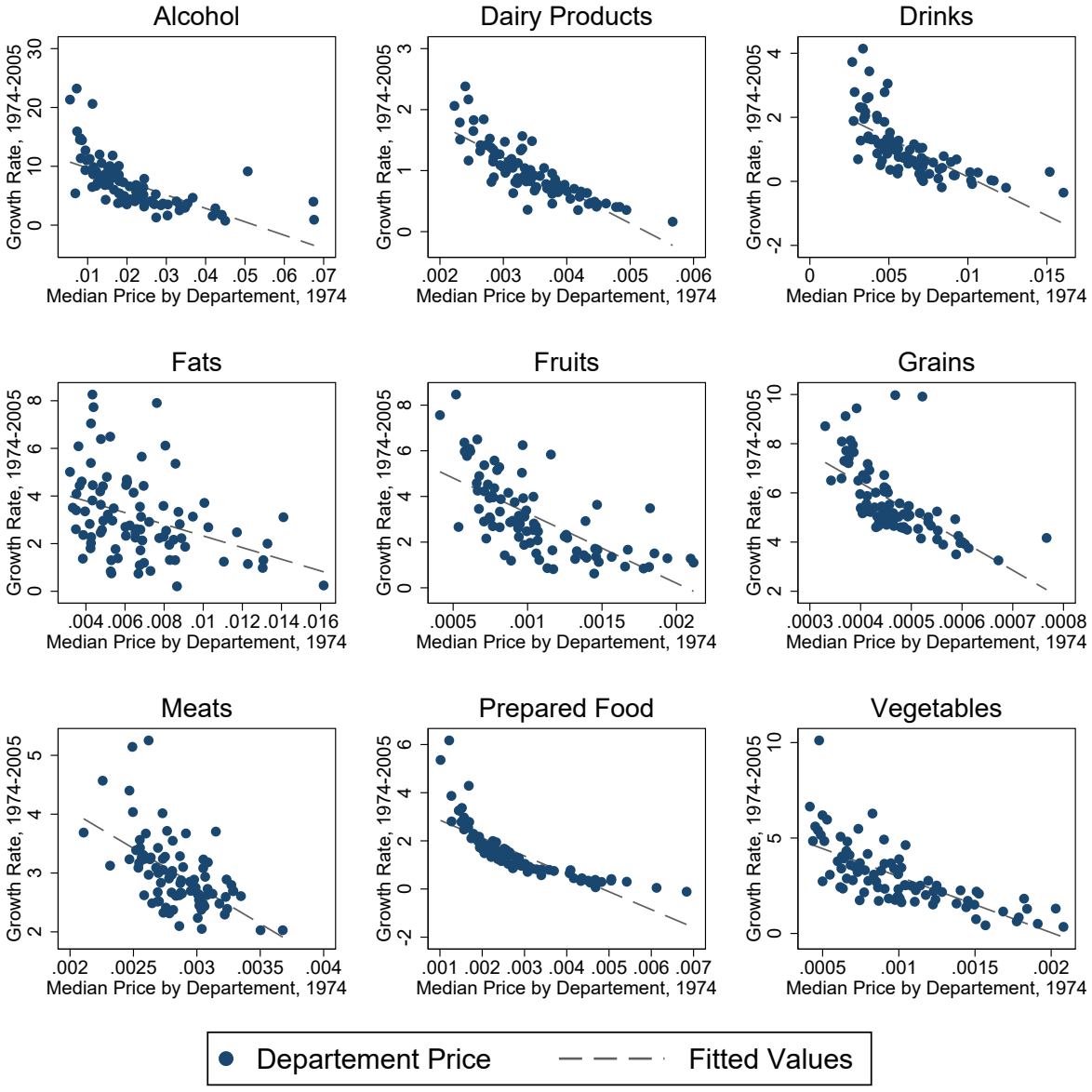


Figure C.3.1: Price Convergence by Category, French Departments, 1974-2005

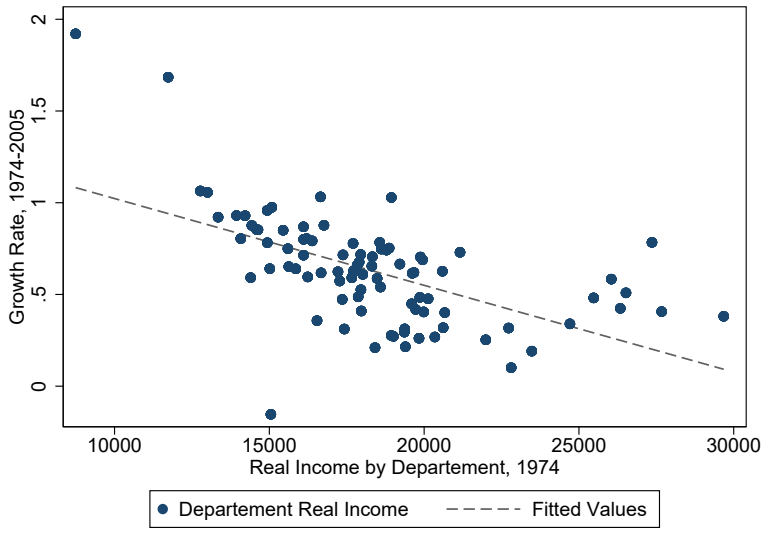


Figure C.3.2: Income Convergence, French Departments, 1974-2005